2. LITERATURE SURVEY

- The work done by Niranjan V and Malini A. (2014) was based on antimicrobial resistance initiated by E coli causing urinary tract infection (UTI). The urine samples tested by Kirby-Bauer disk diffusion. A total of 119 samples were collected, of which 91 were multi drug resistant with resistance to ampicillin, amoxicillin-clavulanic acid, norfloxacin, cefuroxime, ceftriaxone and co-trimoxazole and sensitive to amikacin, piperacillin-tazobactum, nitrofurantoin and imipenem. The authors stated that Diabetes, chronic renal disease and catherization were the reason for high resistance rate.

- Kounteya Sinha (2014) in his report stated that India is the world's largest consumer of antibiotics and warning us of antibiotic-resistant pathogens and a loss of efficacy of antibiotics. The author also states that the huge increase in use of antibiotic, both appropriate and inappropriate, is leading to increases in drug resistance.

- Lee C et. al. (2013) States that antibiotic resistance can be reduced by using antibiotics as per the guidelines. The controlled use of antibiotics in food and animals can also reduce antibiotic resistance. The authors also stated the mode of spread of infection in community like in children through school/day care, healthcare professionals (physicians, pharmacists, and medical students) direct contact with patient etc. the article ended with a statement that the resistance can be conquered by proper hygiene that is to be maintained by people.

- Ghafur A et. al. (2013) and other authors have given information on the Roadmap Meeting and the Chennai Declaration for formation of national policy to control the rising antimicrobial resistance. The policies focuses on rationalizing the usage of antibiotics, both in hospitals and as OTC, to improve infection-control standards, provide structured training on usage of antibiotics and infection control, an Infection Control Team (ICT) mandatory in all hospitals etc. so as to restrain the spread of infection.

- Dubey D et.al. (2013) have concentrated there work on nosocomial and community acquired multidrug resistant strains of Staphylococcus aureus. The work was done by performing antibiotic sensitivity patterns with 16 antibiotics. This study was concluded by stating presence of Methicillin
Resistant Staphylococcus Aureus and vancomycin resistant strains of microorganisms.

- Balaji K et. al. (2013) studied a total of 31 Vibrio cholerae O1 isolates and proved that the strain has become multidrug-resistant with 97% strains resistant to ampicillin and polymyxin B, followed by nalidixic acid, co-trimoxazole, norfloxacin and ciprofloxacin, doxycycline, to gentamicin and chloramphenicol. The study also states that there is biofilm formation, with 24 isolates and eight in them produced strong biofilm.

- The research group of Kumar S et. al. (2012) in their work confirmed the existence of staphylococci infection with Methicillin resistance also they proved that resistance of MRSA was very high for co-trimoxazole and ciprofloxacin.

- Datta S. et. al. (2012) executed their study on extensive use of antibiotics leading to increase in antibiotic resistance in a hospital setting with special emphasis on mechanism of antibiotic resistance in Escherichia coli and Klebsiella pneumoniae. The study confirmed a rise in consumption and resistance to broad spectrum antimicrobial agents and also recognised an association between consumption and resistance to antibiotics.

- Bishara J et. al. (2012) analysed the outcomes of patients with hospital-acquired (HA) and healthcare-associated (HCA) Staphylococcus aureus bacteraemia. Proving the presence of methicillin-resistant S. aureus (MRSA) bacteraemia spread in hospitals by HCA and HA.

- As per the report of Kumar A et. al. (2012), they have unfolded and proved about resistance of antibiotics with respect to chest infection. The authors studied the susceptibility pattern of respiratory segregates of microorganisms to antibiotics in patients with RTIs and reported that Penicillin’s are becoming resistant; Cephalosporin’s highly sensitive in respect to gram negative species, Monobactams sensitivity to Pseudomonas and resistant towards Klebsiella.

- Ganguly NK et. al. (2011) this report emphasise on antibiotic use and its growing resistance in India and actions to be taken to curb resistance. The authors recommended on low use of antibiotics in humans and to stop use in animals and to establish a surveillance system for antibiotic usage.

- D'Costa VM et. al. (2011) Quantified that the antibiotic came into existence about 70 years back and antibiotic resistance in microorganism is a modern
phenomenon, so this view states that the microorganism present pre antibiotic era where highly susceptible to antibiotics. So the author replicated ancient DNA from 30,000-year-old Beringian permafrost sediments and identified that this genes were resistance to β-lactam, tetracycline and glycopeptide antibiotics. The Structure and function studies on the complete vancomycin resistance element VanA confirmed its similarity to modern variants. Thus affirming that, antibiotic resistance is a natural phenomenon.

- **Bandekar N (2011)** performed a study in burn unit with 50 burn patients for a period of two year, and evaluated time-related changes in aerobic bacterial colonization and their sensitivity pattern. The swabs from burn were used to detect the change in pattern of organism. The common most organisms isolated was Pseudomonas aeruginosa, followed by Staphylococcus aureus, Coagulase negative Staphylococcus and Klebsiella. The review of culture test stated that some of the bacteria were highly resistant to particular antibiotic.

- **Anandkumar H et. al. (2011)** focused their study on symptomatic and asymptomatic UTI in pregnant women by documenting the antibiotic sensitivity pattern of Escherichia coli. The work was done using midstream urine samples which were screened for bacteriuria and pyuria. The work concluded by proving that Escherichia coli exhibited high degree of resistance to ampicillin followed by gentamicin, cephalexin, and co-trimoxazole. The increase in antibiotic resistance to ampicillin and cephalexin complicates safe regimen given in pregnancy.

- A study by **Chen YH et. al. (2011)** was dedicated on Monitoring Antimicrobial Resistance Trends (SMART) of Gram-negative pathogens causing intra-abdominal infections (IAIs). The samples were collected from 12 countries and an in-vitro analysis with 12 antimicrobial agents was performed. The author reported that the resistance of Enterobacteriaceae in China and India was higher than in the other countries of this region.

- **Monjur F et. al. (2010)** in their work stated that the antibiotic sensitivity pattern for an organism is very significant for effective control of septicaemia in neonates. Thus the authors designed there study and collected details of 1000 patients. Blood cultures were found positive in 194 neonates. The organisms isolated were Pseudomonas spp., Klebsiella pneumoniae,
Staphylococcus aureus, Escherichia coli, etc. and were sensitive to imipenem and ciprofloxacin, but resistant to antibiotics, like ampicillin and cephalexin.

- **Jombo GTA et. al. (2010)** study was based on performing susceptibility pattern for E. Coli obtained from the patient’s blood culture specimens. The author stated the need for controlling the hospital acquired infection as well as initiating regulation on consumption and sale of antibiotics.

- A statement given by **Kumarasamy KK et. al. (2010)** in their work, reported the presence of Gram-negative multidrug-resistant Enterobacteriaceae with resistance to carbapenem as discussed by New Delhi metallo-β- lactamase 1 (NDM-1) in Chennai, Haryana, UK, and other sites in India and Pakistan indicating wide spread of microorganism. NDM-1 was mostly found among Escherichia coli and Klebsiella pneumoniae, which were highly resistant to all antibiotics except to tigecycline and colistin indicating an worldwide public health threat and need for surveillance.

- The effort taken by **Kumar R et. al. (2009)** showed the presence of Salmonella serovars in seafood and when analysed for resistance to antimicrobials it exhibited high resistance to sulfamethizol and carbenicillin, and restrained resistance to nalidixic acid and oxytetracycline. Yet, antimicrobial resistance was not practically detected against ampicillin, gentamicin, ciprofloxacin, chloramphenicol, and kanamycin in different strains of Salmonella serovars. The study also pointed out multi drug resistance of Salmonella serovars.

- A work done by **Chande CA et. al. (2009)** on hospital acquired and community acquired Methicillin Resistant Staphylococcus Aures (MRSA) infections in the nasopharynx of the children/ paediatric population. The nasopharyngeal swabs were collected from children between six to ten years of age and were subjected to antimicrobial testing, which indicated that about 7.38% of children were carriage of staphylococcus aureus and the Methicillin Resistant Staphylococci constituted 4.16%.

- **Varaiya AY et. al. (2008)** discussed about the pathogens (E coli and K pneumoniae) in diabetic (type 2) foot lesions which produce ESβL and which may not be visible by routine susceptibility test. A total of 134 isolates were tested for antimicrobial susceptibility by disc diffusion technique and was found that 31 sample produced ESβL with were 100% sensitive to carbapenem.
(imipenem and meropenem) and resistant to amoxicillin and ampicillin. The author also emphasis on ESBLs confirmation to be done by using E strip method.

- **Sinha P et. al. (2008)** discussed about the resistance to broad spectrum β lactams, arbitrated by extended spectrum beta lactamase (ESβL) and AmpC βL enzymes. This in infections can cause treatment failure if not treated appropriately. The study was done using samples identified with Escherichia coli with ESβL, AmpC βL-production and then reported on antibiotic sensitivity pattern.

- **Peters NK et. al. (2008)** this study was concentrated on the amount spent each year by National Institute of Allergy and Infectious Diseases (NIAID) to study and do research on antimicrobial resistance. Majority of amount is consumed on understanding the causes, consequences, and treatments of antimicrobial drug resistance.

- **Mathai, E. et. al. (2008)** the authors collected samples from rural and urban area and have performed there work on antimicrobial resistance and stated that E. coli was resistant to one or more antimicrobials, 8.4% microorganism were resistant to three drugs used in UTI, i.e. ampicillin, co-trimoxazole and nalidixic acid, 1.5% of isolates were resistant to nitrofurantoin and no difference between (both high) resistance pattern obtained from rural and urban area.

- **Agrawal P et. al. (2008)** studied and described the prevalence of Extended-spectrum β-lactamases producers among Escherichia coli and Klebsiella pneumoniae isolates by performing antibiogram profile for commonly used antibiotics. The study found that 80 isolates were ESBL producers proving that ESBL-producing isolates of E. coli and K. pneumoniae to be 22%.

- **Rajaduraipandi K et. al. (2006)** reported the importance of study on Methicillin resistant Staphylococcus aureus (MRSA) in nosocomial infections. The authors have screened the samples and subjected to antibiotic sensitivity test. They established that majority of MRSA strains were resistant to penicillin, followed by ampicillin, gentamicin, cotrimoxazole, cephalexin, erythromycin, and cephotaxime. They also observed Multidrug resistance. However, all strains were sensitive to vancomycin.
Paterson DL. (2006) states the importance of managing serious infections by providing timely and proper broad-spectrum realistic therapy for individual patients, which can improve the outcomes, and thereby reducing unnecessary use of antibiotics contributing towards development of resistance. The author also discussed the importance of concealing the spread of antimicrobial resistance.

Manna, S. K et. al. (2006) have researched on the existence of E coli serotype O157 in cattle stool, its virulence properties and antimicrobial resistance. The study involved collection of faecal sample and detect the presence of E coli serotype O157, if present to find out its sensitivity pattern towards antibiotics. They collected a total of 14 strains, out of which 10 were resistant to at least one of the antimicrobial agents and suggested that as human comes in regular contact with cattle; a large number of people might be at the risk.

Kapil A (2005) reviewed various articles and concluded that if an infection is to be tackled in a broad and timely manner, resistance can be minimised. If we use antibiotic in an appropriate manner we may prevent the development of resistance by a microorganism. The author also states various ways the microorganism attains the resistance and use of antibiotics in agriculture, aquaculture, veterinary practice, poultry and even in household products which should be restricted.

Rosenthal VD et. al. (2003) This report is based on education and performance feedback of intensive care units, for intravascular device (IVD) associated bloodstream infection (BSI). The authors collected the details from all admitted, adult patients with a central vascular catheter and compared with and without education the performance feedback. The results were promising as after educating the patients there was a significant reductions in rates of IVD-associated BSI.

As per Mathur P et. al. (2002) work the extended spectrum beta lactamase (ESBL) producing Gram negative bacteria are responsible for a majority of hospital infection. Thus the authors examined involvement of ESBL producing Gram negative bacteria in producing the infection. A total 678 strains was tested and found that 458 were ESBL producers. The case remained high in Klebsiella spp. They have also divided ESBL as per the location were the sample was collected.
The study done by Levy SB. (2001) states that the use of antibacterial products in healthy households has increased to more than 700 different commodities today. These were developed to avert spread of ailment causing microorganisms amongst patients, mainly in hospitals. But its use has increased in healthy households also, even though there is no report of any health benefit. The author hints about a link between resistances seen in community acquired MRSA and the use of antibacterial products. Thus cautious use of antibiotic is been urged.

Garg PK et. al. (2001) performed a study on secondary infection in acute pancreatitis and stated the presence of Escherichia coli and Pseudomonas aeruginosa. The antibiotic sensitivity pattern indicated that the microorganism were sensitive to third generation cephalosporins and quinolones.

Suri A et. al. (2000) the study revolves around Acinetobacter infections in neurosurgical patients. The authors reported that Acinetobacter isolated from sputum/tracheal secretions were mostly sensitive to amikacin, cefotaxime and ceftriaxone; while CSF isolates were sensitive to ciprofloxacin, amikacin and netilmicin, in 11 cases the organism was resistant to all antibiotics.

Goldmann DA et. al. (1996) in this report the authors have given some strategies to combat the occurrence of antimicrobial resistance. Some important approved strategies are like optimizing antimicrobial prophylaxis for operative procedures, optimizing choice and duration of therapy, improving antimicrobial prescribing by educational and administrative means, monitoring and providing feedback regarding antibiotic resistance etc.in order to detect, report, and prevent transmission of antimicrobial resistant organisms.

Kunin CM (1993) the author discussed about the introduction of penicillin 50 years ago was followed by its vigorous, and undesirability use. There by appearance of resistant bacterial strains which have spread throughout the world due to genetic flexibility of the microorganisms. Even though new and more expensive drugs have appeared, but it is doubtful that they will exist. So an urgent need exists for more appropriate selection and use of antimicrobial drugs.

Neu H C (1992) in his articlestated that use of large numbers of antibiotics has triggered the threat of bacterial resistance. Most of the organisms that cause
diarrhoea, urinary infection and sepsis, are now resistant to majority of older antibiotics. This might be due to widespread use of antibiotics in community and hospitals. The author then states the need of antibiotic control programs, better hygiene, and synthesis of agents with improved antimicrobial activity to limit bacterial resistance.

- Kunin CM et. al. (1973) study focused on overuse of antibiotics which is both wasteful and related with a high incidence of disagreeable reactions. The Study also pointed out that more than half of the antibiotics used were not needed, or that an unsuitable agent is chosen, or the dose is incorrect. Antibiotics accounted for high pharmacy budgets and gentamicin use was the highest of all antibiotic. The use of cephalexin, casted highest and almost equalled all other oral antibiotics combined.